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ABSTRACT

Australian research into competency-based training and assessment is very thin and theoretical discussion is often superficial. One curious feature in the Australian debate is the belief by many that competency-based training is possible without competency-based assessment. Definitions are being debated. In a longitudinal study, researchers have found a high acceptance of the main aspects of competency-based training, but for both students and staff there are considerable attitudinal concerns. Other research has found the following: research gives little or no encouragement to transferability proponents; competency-based training has been firmly linked with total quality management; a probabilistic model of competence is promoted; no one really knows what the true costs are likely to be to industry and the community; most areas of college accommodation would be affected; the "evidence-based judgmental model" of assessment is gathering some support; a commitment to equity is necessary; a common certificate of attainment is critically important; and prior learning must be recognized. Four key issues arise: transferability assumptions made by some must be tested; important issues such as practicability and cost deserve further consideration; much greater attention must be given to competency-based assessment; and whether learning is improved as a consequence of competency-based training. (Contains 47 references.) (YLB)

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REVIEW OF RESEARCH

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Competency-based training and assessment

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REVIEW OF

RESEARCH

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Competency-based training and assessment

William Hall

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INTRODUCTION

This research review is the first of a series of monographs which will summarise and comment on current research issues. It is planned to publish three or four of these monographs each year.

Almost all publications cited are post-1990, with an emphasis on Australian research. The publications have been carefully selected: the author has not merely conducted a blanket literature search and attached the print-out. A publication is included because it is worth reading.

The monographs should have a wide readership, but will be of special interest to policy-makers who are wanting very brief research summaries together with policy implications.

THE CONTEXT

Competency-based training is one of four elements of the training reform agenda. The four elements are

- competency-based training
- national recognition arrangements
- an open training market
- new entry-level training.

In addition, there is a continuing commitment to equity issues.

As its contribution to the training reform agenda, vocational training has been set the following challenges:

- ▷▶ to support industry restructuring by providing suitable on-the-job and off-the-job training
- ▷▶ to develop and implement competency-based training and assessment
- ▷▶ to create new approaches to delivery
- ▷▶ to develop and implement a new credential framework and new accreditation procedures
- ▷▶ to form new relationships with schools, universities, training organisations, private providers and employers.

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The second of these (development of competency-based training and assessment) is a component of the other four, and so a very great deal indeed is hanging on the success of competency-based training and assessment.

One reason for the competency push has been the increasing dissatisfaction with time-serving apprenticeships. In 1987 and 1988 a number of working party reports were critical of training approaches and all of them promoted standards-based training. Competency-based training and competency-based assessment, then, are important trends in vocational training.

Although this monograph just deals with competency-based training and assessment, it is important to set training and assessment in context. For example, given the commitment to a competency-based approach, there are likely to be additional vocational training relationship problems, especially with schools and universities and these are starting to appear. In other words, the competency commitment will permeate all vocational training activities and relationships, not just the curriculum. Indeed, as one researcher has argued, it is not essentially a curricular issue at all (Jackson, 1993).

Training is politically important. It is seen as one way to improve productivity, to reduce unemployment and to help solve social (equity) problems. Therefore, the consequence of switching to competency-based training has important political ramifications.

Murphy (1990) must be regarded as one of the architects of the Australian competency-based training movement. In his paper he discusses major issues such as the development of standards, the ways of delivering competency-based training, and approaches to assessment. He pointed out that very little competency-based training was occurring (quoting research completed by the TAFE National Centre for Research and Development [now NCVER]) and that the concept must be marketed.

Murphy traced the history of the competency movement, pointing out that in 1988 the structural efficiency principle emphasised the need to develop a competency-based training and assessment system. He pointed out that standards were central to the process.

One of the country's major assessment researchers is Thomson (1991) who has argued for the need to understand competence in context. His report on competency-based training in TAFE (Thomson, et al. 1990) which Murphy (1990) referred to, was the first national survey and it helped to make people realise that a huge task was involved in switching to a competency-based approach. The report is sometimes criticised for its broad definition of 'competency-based approach'. Leaving aside that this was the (then) agreed definition, a narrower definition would have produced even fewer examples of competency-based programmes, and hence made the argument even more persuasive.

Thomson (1993) has also produced a summary of competency-based assessment research completed, research in progress, and research needed. He cites over 30 references and attaches a list of research topics which he believes need attention. The picture he paints is not a bright one:

> *When I'm asked what research has been or is being carried out into competency-based assessment in this country, the answer has to be—not much . . . I can find little Australian research which backs up the decisions the 'experts' are making. (p.13)*

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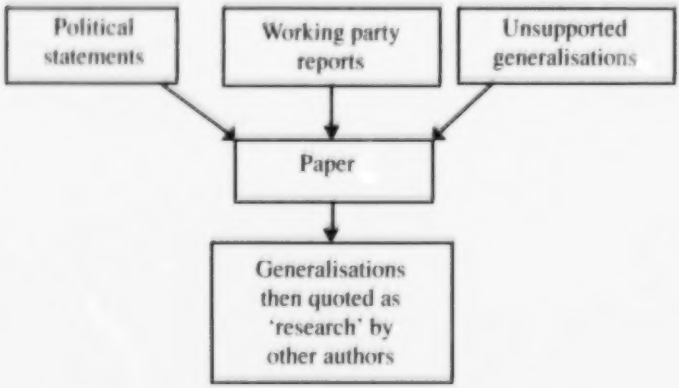
The move towards competencies was a policy decision which has major political and practical implications. Therefore, one would hope to find a good research base for that decision. This is not the case, as the next section will show.

RESEARCH BASE

For those interested in a discussion of research into the introduction of competency-based training in England, Burke (1989) covers a wide competency canvas. This should be read in conjunction with a more recent criticism of the National Vocational Qualification (Smithers, 1993). The English research is important because a number of the models appear in amended forms in a few Australian papers.

Unfortunately, Australian research into competency-based training and assessment is very thin indeed and theoretical discussion is often superficial. A very large number of papers have been written, but not all could be termed 'research'. What we have more often than not is the following structure (Hall, 1993):



This situation is not uncommon in vocational training, where major policy decisions are sometimes taken with very little underpinning research support.

Papers abound which define, attack and defend competency-based training and competency-based assessment. Some people in higher education, in particular, have been especially antagonistic, although it must also be said that some of the strongest defence has also come from universities. Hager (1993) is one such defender. He argues that 1970s arguments are being used to attack the concept of competency, whereas the concept itself has changed since then.

One curious feature in the Australian debate is the belief by many that it is possible to have competency-based training without competency-based assessment! Evidence for this may be found in recent curriculum documents. However, without competency-based assessment there can be no competency-based training. Curriculum developers, especially, have yet to understand this truism. Similarly, competency standards are being developed with no apparent thought being given to how they will be assessed.

There are other concerns also being expressed: the total cost of switching to competency-based training has never been calculated. Large amounts of money have been spent; equally large amounts continue to be spent. For such a basic and all-embracing change to training, one might have expected a fairly standard curriculum development procedure to have been followed:

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- development of new curricula
- limited trial
- evaluation
- amendment to curricula
- staff development
- widespread introduction.

(The Australian Vocational Certificate is, however, being trialled.)

We are still debating definitions and many recent papers have introductory sections where definitions are discussed. For example, Sheldrake (1993) poses three important questions with regard to the nature of 'competency':

> *So, now I have three concerns:*
>
> ▷▶ *Are we assessing competence as demonstrated, or as potential?*
>
> ▷▶ *Are we assessing competence as learnt, or as a current ability?*
>
> ▷▶ *Are we assessing competence, or situational learning? (p. 4)*

These questions get to the heart of what is meant by 'competency'. Many are already expressing concern that 'knowledge' is not being assessed (Sheldrake's second question, but also related to the other two).

There has been too little debate on issues of this kind; it is almost as if time is too short to discuss fundamentals. In sporting terms: never mind about the rules, let's get on with the game!

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One researcher who has raised fundamental issues is Stevenson (1993). In his well-argued paper he concludes:

> *In this paper, I have outlined the essential aspects of the government's skill formation policies and argued that the assumptions underlying the economic goals, the role assigned to knowledge and to education, and the government's exercise of power and control need criticism. Then I argued that, even if*

the policies were appropriate, their attainment would be jeopardised by the CBT paradigm, and its associated paraphernalia such as modular curricula. (p.81)

One oft-repeated major concern of competency-based training critics is that complex learning is being broken down into small steps, an approach advocated by Skinner (1953) in his stimulus-response theory, which is now not generally supported by learning psychologists. There is some reinforcement of Skinner's approach in the breaking down of complex tasks into check-lists for assessment purposes.

The Australian approach to competency-based training owes a great deal to the development of competency-based training in Scotland. In view of Scotland's decade of experience, it seems sensible to draw upon their research findings. Gunning (1993) has summarised the Scottish lessons. Perhaps the most important lesson for Australia is that Scotland developed training and assessment in parallel. Other lessons include the importance of staff development, the need for quality assurance mechanisms, and the place of regional and local networks.

The Australian research base, then, is not a strong one. Fundamental questions are rarely discussed, and some important overseas evidence is apparently ignored. Nevertheless, there are examples of research and some of these examples are now outlined.

RESEARCH EXAMPLES

One of the few longitudinal studies undertaken in this country was by Harris et al. (1985, 1987) which compared 1983, 1984 and 1985 students at the Croydon Park College of TAFE, South Australia, who were involved in a competency-based panel beating course. The purpose of the research was to investigate the potential of this type of course for all occupational training. Five areas were evaluated:

- development and implementation
- staff training
- evaluation of effectiveness and efficiency
- evaluation of competency-based resources and facilities
- impact on college, staff and students.

The researchers found that there was a high acceptance of the main aspects of competency-based training, but for both students and staff there were considerable attitudinal concerns (such as low staff morale as a team). Any new curriculum approach requires time for successful implementation. There must be staff development, trialling of material, and evaluation.

Thomson (1993) has described the relationship between competency-based assessment and learning. He has warned that the consequence of competency-based assessment could be an unintended effect on learning: a repetitive and sterile training environment. He quotes Pandy (1990) who states that 'assessments should serve as exemplars of good teaching practices that are not likely to distort the teaching and learning process'. In other words, training and assessment must be integrated, each supporting the other.

Competency-based training has been used since 1979 to train vocational education teachers at the University of South Australia. Harris (1993) has reflected on 14 years of this experience, has distilled ten key assessment issues as part of that reflection, and considered assessment in two course modules:

- 1 Assessments will cover the range of skills and knowledge sufficient to demonstrate competency.
- 2 Assessment of competency should be a process which integrates knowledge and skills with their practical application.
- 3 During assessment, judgements to determine a learner's competency should, wherever practicable, be made on evidence gathered on a number of occasions and in a variety of contexts or situations.
- 4 Assessment practices should be monitored and reviewed to ensure that there is consistency in the creation and interpretation of evidence.
- 5 Assessors must be competent in terms of the national competency standards for assessors.
- 6 Assessment should cover both the on- and off-the-job components of training.
- 7 Assessment procedures should provide for the recognition of competencies no matter how, where or when they have been acquired.
- 8 Assessment procedures should be made accessible to learners so that learners can proceed readily from one competency standard to another.
- 9 Assessment practices and methods must be equitable to all groups of learners.

▶ 10 Assessment procedures and the criteria for judging performance must be made clear to all learners seeking assessment.

The list illustrates that assessment is a highly skilled business demanding considerable professional commitment.

There are a few examples of successfully introduced competency-based training in industry, one of which is at the Australian Newsprint Mills Ltd (Bishop, 1993) where training, assessment, accreditation and staff promotion have been integrated.

Key competencies in small business were considered by Thompson (1992) who raised three questions:

▷▶ Do the Finn and Mayer key competencies apply to small business?

▷▶ Is it sensible to talk about 'standards' and 'levels' in small business?

▷▶ Are externally imposed competencies different from those required by the actual job?

Her research indicated that the Mayer framework would need to be adapted for small business; and small business supported the need for a strong, general education.

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Transferability of skills is an assumption made both by VEETAC (1992) and by the National Training Board, NTB (1992). However, as Hall (1993) has pointed out, a large quantity of research over very many years gives little or no encouragement to the transferability proponents. In fairness, it should be pointed out that this research was conducted with school children. There is an urgent need for the assumption to be tested with trainees. Of

course, it is possible to have 'key competencies' without transferability. But some do make the transferability assumption, so it needs to be clearly stated that (at present) there is no strong research evidence to support this. For example Thomson (1990) examined transferability from the perspective of 'problem solving and the transfer of skills'. He confirmed that vocational educators just assumed that skill transfer was possible. Resnick (1987) also offers no support for transferability, claiming that skills acquired in one discipline do not generally transfer to other disciplines or even to everyday life. In this she is confirming Stone's (1966) earlier summary of the research into transferability.

Rumsey (1993) has firmly linked competency-based training with total quality management (TQM): '. . . competency-based training itself can be seen as the focal point of TQM activity' (p.1). Butterworth (1993) extends this, pointing out that 'traditionally, much of what has been regarded as assessment has been based on quality control notions and not upon the idea of systematic quality assurance. The difference affects how standards are set, how delivery is effected and how assessment is made.' (p.9)

Masters (1993) persuasively argues that the 'can do' model of competence/achievement/assessment, which is central to many current initiatives in education and training, is based on a hankering for certainty that is incompatible with the context-dependent nature of human performance. He promotes a probabilistic model of competence and illustrates it with examples from the professions in the USA. A related paper (Masters and McCurry, 1990) on competency-based assessment in the professions enlarges the examples.

Casey's (1993) concern is that fragmented assessment leads to the fundamental assessment issues being ignored. He also points out

that assessment is everyone's responsibility, not just the job for a hand-picked few. Indeed, the very idea of 'quality' relies upon it being an integral part of everyone's work. The implication that everyone should be involved in assessing competency has important financial (and other practical) consequences.

The cost of competency-based training has become a matter of some concern and has had a thorough reviewing in one paper (Bloch, 1993). Although competency-based training cost was a consideration of the Training Costs Review Committee (1990), the impression gained is that no one really knows either *what* it will cost or *who* is going to pay for it. Bloch (1993) confirms this, stating that it is difficult to ascertain what the true costs are likely to be to industry and the community. She also properly points out that economic costs are not the only ones: social costs also matter.

The NSW TAFE Commission (1992) has researched the implications for TAFE facilities posed by the introduction of competency-based training. They showed that most areas of college accommodation would be affected. In other words, it is just not feasible to switch to competency-based training without making necessary changes to teaching/training areas and to learning support. Once again, the cost implications are clear.

Bailey (1993) says that good assessment should emphasise what people can do, whereas examinations have (more often) attempted to find out what people can't do. In other words, traditionally examinations have been a hurdle to trip people. Competency-based assessment is supported by that author because it does attempt to find out what people are capable of doing.

The 'evidence-based judgement model' of assessment is gathering some support. This was propounded by VEETAC (1993) and further explained by Gibb (1993). In essence, what is being promoted is that assessment should be regarded as an integrated part of the learning process, not separate from it, and should be regarded as part of the trainer–trainee partnership. This has also been argued above. None of this should be exceptional. Thirty years ago curriculum developers were rejecting the linear approach (which started with objectives and ended with assessment) for the circular, interactive approach which integrated assessment with all other components of the curricular process. Nevertheless, many of those involved in competency-based curricula seem to have almost a total emphasis on 'outcomes'. This is dangerous, because the curriculum comprises far more than outcomes. In particular, assessment should be part of the learning process, not just a measure of learning outcome. Ramsey (1993) agrees with this:

> *It does not follow from the emphasis that the reform agenda places on 'outcomes' and the recognition of acquired skills that the learning process is unimportant. The learning process is critically important to those seeking skills. (p.1)*

This is because the knowledge gained may be just as important as the skills observed.

Fegent (1993) warns that competency-based training has led to more frequent assessment (he uses the term 'atomisation') and, because much of this assessment is print-based, what is really being assessed is literacy skill. He gives an example of a chemical plant storeman, who

> *. . . by his own self-assessment showed he could read very little and could do none of the matters assessed by the course. Despite this, management regarded him as highly competent in his job—he could, based on years of practice, handle all the duties required of him yet he would have extreme difficulty coping with the Chemical Plant Skills Course. He is typical of many operator level workers being faced with formal off-the-job training— petrified by the prospect. (p.3)*

He ends by challenging everyone to commit time and resources to integrate language, literacy and numeracy with their course design.

'Atomisation' of assessment is clearly not supported by Smith (1993) who is in favour of 'holistic' assessment, using a wide variety of assessment techniques, a theme picked up by Gonczi (1993) who uses the term 'integrated approaches'.

Since 1990 the Victorian Recognition and Assessment Centre has been situated at Broadmeadows College of TAFE. One of its projects has been to identify practical issues faced by enterprises when they introduce competency-based assessment. To do this they have worked with over 260 companies. One of the concerns listed by Davis (1993) as a consequence of this work is that particular groups might be disadvantaged because of formal assessment; for example, women or people from non-English speaking backgrounds. She says that a commitment to equity is necessary to allay such fears.

Connor (1993) makes the plea that assessors' competency standards should take into account the different assessment measures that may be needed to assess people with disabilities. He points out that many employers have a negative attitude

towards employing people with disabilities, but that those who do employ such people discover that their fears are groundless.

There has been recent debate over whether competency should just be dichotomous or whether it is possible to have levels of competency. Peddie (1993a) has explored this and has produced the following approaches to the award of merit (Peddie, 1993b):

APPROACHES TO THE AWARD OF MERIT

I	**No Award of Merit**
II	**Merit based on learning outcomes**
1	Achievement of standards required for the next level
2	Achievement at levels well beyond the credit standard
3	Speed; attaining learning outcomes at a faster rate
4	Consistency of performance
III	**Merit based on factors beyond the learning outcomes**
5	Transfer of skills to new situations
6	Achievement of additional learning outcomes
7	Originality; creativity; 'flair'
8	Outstanding attitudes, approach to learning, motivation
9	Merit awarded to top 5 or 10 per cent
IV	**Merit awarded at the completion of a qualification**

(Peddie, 1993b, p. 13)

He has recognised that some of these categories (especially number nine) would not be acceptable in a competency-based system.

Jorgensen et al. (1993) emphasise the critical importance of a common certificate of attainment: '. . . no matter how good the underpinning process, if evidence of attainment is not communicated in a manner meaningful to users, then that evidence may as well not exist.' (p.6)

The recognition of prior learning has been one theme consistently running through the literature. Thomson (1992) has described the assessment of prior achievement and has outlined different ways in which the assessment may be done. 'Articulation' is one aspect of the recognition of prior learning which, of course, may also occur in traditional assessment.

Some countries are well ahead of Australia in developing competency-based training and competency-based assessment. Scotland (a good example to take, because the whole of Australian education was originally modelled on Scotland) has had ten years of experience of competency-based assessment. This has been described by Gunning (1993). He asserts that 'the changes have been successful in:

- changing the approach to teaching, learning and assessment in centres
- increasing access to vocational qualifications
- providing a flexible and progressive system of awards
- developing credit transfer
- introducing new, more flexible routes to certification'. (p.142)

A major Scottish research project (Mitchell and Cuthbert, 1989) 'explored a number of different options in the testing of competency' and tested 'a variety of models'. It was especially critical of competency tests, concluding that they were an expensive way of gathering evidence (which could be gathered more readily by other means); and asserting that the competency tests that were being used at that time were unlikely to give sufficient evidence to infer competence.

Most researchers emphasise the pedagogical issues associated with competency-based training. However, Jackson (1993) explains that a belief in competency-based education has got nothing to do with trainee learning, because 'the competency paradigm has not and probably will not improve learning in most of the educational contexts where it has been applied' (p.105). Rather, competency-based training 'is significant in today's policy climate not because it will improve learning but because it provides an infrastructure for determining how and by whom educational goals and standards will be set' (p.14). So, competency-based training is not an educational matter at all, but a management and a political tool, according to Jackson.

WHAT CAN WE LEARN?

What, then, are the key issues that arise from this research review? There are four:

- Transferability assumptions made by some must be tested.
- Important issues such as practicability and cost deserve further consideration.
- Much greater attention must be given to competency-based assessment.
- Is learning, in fact, improved as a consequence of competency-based training?

What further generalisations may be made? First, important policy decisions may have sometimes been made on flimsy, or non-existent, or negative research evidence. Second, there is a huge quantity of opinion around, some of it not supported by research evidence. That opinion is then sometimes quoted as actual evidence. The 'hard' research base is sometimes very thin indeed.

We are in a situation today similar to that presented by the moves of 30–40 years ago to base education on 'behavioural objectives'. Indeed, the similarities are uncanny:

- protagonists who were unswerving in their dedication
- little research support (e.g. millions of dollars were spent on validating Bloom's taxonomy, without success)
- wholesale rewriting of curricula

- total restructuring of assessment
- a simple, evangelical logic, which was difficult to argue against (faith usually is)
- a multi-million dollar industry with reputations at stake.

Did any good come of the behavioural objectives movement? Yes, it did: it made people ask what they were trying to achieve; learning was no longer a mystery tour with an unknown destination. A student had the right to know the destination and the right to know how successful arrival was to be determined.

What is likely to be the eventual outcome of competency-based training? Perhaps a better integration of theory and practice (and of off-the-job with on-the-job), although some have yet to appreciate the importance of knowledge in competency-based training. Perhaps an unravelling of many skills, so that training becomes rather more systematic and (hopefully) more efficient (and more effective). Perhaps a recognition that different pathways can all lead to the same destination, thus allowing for increased flexibility in delivery. However, that is another story. □

REFERENCES

Papers marked with an asterisk (*) were delivered at the NCVER and NSW TAFE Testing Times conference.

*Bailey, M 1993, Judgement, evidence and the assessment of competency, NCVER, Adelaide.

Bishop, C 1993, 'Competency-based career structures - the struggle.' Paper presented to the VEETAC Assessment Research Forum, VEETAC, Melbourne.

*Bloch, B 1993, 'Costing testing', NCVER, Adelaide.

Burke, J W (ed.) 1989, *Competency-based education and training*, Falmer Press, London.

*Butterworth, P 1993, 'Assessment as quality assurance: Some issues', NCVER, Adelaide.

*Casey, D 1993, 'Assessment: The process of quality assurance for education and training', NCVER, Adelaide.

*Connor, E 1993, 'Competency assessment mechanisms and reasonable adjustment', NCVER, Adelaide.

*Davis, S 1993, 'Enterprise-based assessment?', NCVER, Adelaide.

*Fegent, I 1993, 'Language and Literacy issues in CBT assessment', NCVER, Adelaide.

*Gibb, J 1993, 'Trainers/assessors and learners: The human face to the new CBVET system', NCVER, Adelaide.

Gonczi, A 1993, *Integrated approaches to competency-based assessment*. Paper presented to the VEETAC Assessment Research Forum, VEETAC, Melbourne.

Gunning, D 1993, 'Lessons learned in Scottish competence-based systems' in Hall, W (ed.) *What future for technical and vocational education and training?*, NCVER, Adelaide.

Hager, P 1993, 'How convincing are the arguments against competency standards?' in Hall, W (ed.) *What future for technical and vocational education and training?*, NCVER, Adelaide.

Harris, R et al. 1985, *Competency-based vocational education: An evaluation*, TAFE National Centre for Research and Development (now NCVER), Adelaide.

Harris, R et al. 1987, *Competency-based vocational education: A continuing evaluation*, TAFE National Centre for Research and Development (now NCVER), Adelaide.

*Harris, R 1993, 'Reflections in the assessment of vocational teachers' competence', NCVER, Adelaide.

Jackson, N S 1993, 'Reforming vocational education? Contradictions of competence' in Hall, W. (ed.) *What future for technical and vocational education and training?*, NCVER, Adelaide.

Hall, W 1993, *Does research influence policy?* Paper to the TAFE Senior Executives Conference, NCVER, Adelaide.

Joint ACTRAC-NFROT-CBT-NTB Working Party on curriculum format (1992), *User's guide to course design for competency-based curriculum*, ACTRAC, Melbourne.

*Jorgensen, K, Lloyd, T & Martinek, J 1993, 'Statements of attainment: A matter of trust', NCVER, Adelaide.

Masters, G N & McCurry, D 1990, *Competency-based assessment in the professions*, AGPS, Canberra.

Masters, G N 1993, *Certainty and probability in assessments of competence*. Paper presented to the VEETAC Assessment Research Forum, VEETAC, Melbourne.

Mitchell, L & Cuthbert, T 1989, *Insufficient evidence?*, SCOTVEC, Glasgow.

Murphy, M 1990, *Competency-based training: COSTAC working party report* in the proceedings of the conference 'Assessment and standards in vocational education and training', TAFE National Centre for Research and Development (now NCVER), Adelaide.

NSW TAFE Commission 1992, *Competency-based training: Implications for TAFE facilities*, NSW TAFE Commission Planning and Properties Division, Sydney.

NTB 1992, *Policy and guidelines, 2nd Edition*, NTB. Canberra.

Pandy, T 1990, 'Power items and the alignment of curriculum and assessment' in Kulm, E (ed.), *Assessing higher order thinking in mathematics*, AAAS. Washington D.C.

*Peddie, R A 1993a, 'Levels, grades and merit in competency-based assessment', NCVER, Adelaide.

Peddie, R A 1993b. *Standards of excellence: The award of merit in competency-based assessment*, New Zealand Qualifications Authority, Wellington.

Ramsey, G 1993, *Competence, excellence and curriculum*. Paper presented to the VEETAC Assessment Research Forum. VEETAC, Melbourne.

Resnick, L B 1987, *Education and learning to think*, National Academy Press, Washington D.C.

Rumsey, D 1993, 'A practical model for assessment of workplace competence within a competency-based system of training', NCVER, Adelaide.

*Sheldrake, P 1993, 'Issues in assessment—the competency challenge', NCVER, Adelaide.

Skinner, B F 1953, *Science and human behaviour*, MacMillan, New York.

Smith, L 1993, *Some thoughts about holistic assessment*. Paper presented to the VEETAC Assessment Research Forum, VEETAC, Melbourne.

Smithers, 1993, *All our futures*, Channel Four Television, London.

Stevenson, J 1993, 'Policies and practices in vocational education and training in Australia' in Hall, W C (ed.) *What future for technical and vocational education and training?*, NCVER, Adelaide.

Stones, E 1966, *An introduction to educational psychology*, Methuen, London.

Thompson, M 1992, *Key competencies in small business*, NCVER, Adelaide.

Thomson, P 1990, 'Problem solving and the transfer of skills', *Australian Journal of TAFE Research and Development*, vol. 6, no. 1, pp.66-67.

Thomson, P et al. 1990, *Competency-based training in TAFE*, TAFE National Centre for Research and Development (now NCVER), Adelaide.

Thomson, P 1991, *Competency-based training: Some development and assessment issues for policy-makers*, TAFE National Centre for Research and Development (now NCVER) Adelaide.

Thomson, P 1992, *Assessing prior achievement: Methods for recognising learning gained through experience*, DEET, Canberra.

Thomson, P 1993, *Current research issues in competency-based assessment*. Paper to the TAFE Senior Executives' Conference, NCVER, Adelaide.

Training Costs Review Committee 1990, *Training costs of award restructuring, volumes 1 and 2*, AGPS, Canberra.

VEETAC 1992, *Assessment of performance under competency-based training*, VEETAC, Melbourne.

VEETAC 1993, *Competency-based assessment: Na'ional assessment research forum report*, VEETAC, Melbourne.

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